CLAIMS:

1. An appliance comprising:

(a) a converter capable of using a substantially carbon-free hydrogen;

(b) a hydrogen storage container including a nanostructured material capable of storing the substantially carbon-free hydrogen in a condensed state;

(c) a charger capable of facilitating the storage in the condensed state of a substantially carbon-free gaseous hydrogen provided to the storage container; and

(d) a discharger for liberating the condensed substantially carbon-free hydrogen from the nanostructured material of the hydrogen storage container so as to be available for use in the converter.

2. The appliance according to Claim 1, further including a controller for regulating the cooperation of the converter, the charger, and the discharger.

3. The appliance according to Claim 1, further including an exhaust.

4. The appliance according to Claim 1, wherein the converter is for propulsion.

5. The appliance according to Claim 4, wherein the propulsion converter is combustion-based.

6. The appliance according to Claim 5, wherein the combustion-based propulsion converter is an internal combustion engine.

7. The appliance according to Claim 5, wherein the combustion-based propulsion converter is a turbine.

8. The appliance according to Claim 4, wherein the propulsion converter is chemical-based.

9. The appliance according to Claim 8, wherein the chemical-based propulsion converter is a fuel cell-based system.

10. The appliance according to Claim 1, wherein the converter is a power generation system.

11. The appliance according to Claim 10, wherein the power generation system is a combustion-based system.

12. The appliance according to Claim 11, wherein the combustion-based system is a turbine.

13. The appliance according to Claim 10, wherein the power generation system is a fuel cell-based system.

14. The appliance according to Claim 13, wherein the fuel cell-based system is a hydrogen-oxygen electrical generator.

15. The appliance according to Claim 1, wherein the converter is a thermal management system.

16. The appliance according to Claim 15, wherein the thermal management system is a heating system.

17. The appliance according to Claim 16, wherein the heating system is a combustion-based system.

18. The appliance according to Claim 16, wherein the heating system is a hydrogen-oxygen electrical generator.

19. The appliance according to Claim 15, wherein the thermal management system is a cooling system.

20. The appliance according to Claim 1, further including a hydrogen gas supply communicating with the charger.

21. The appliance according to Claim 1, wherein the charger further includes a conditioner for facilitating hydrogen charging of the nanostructured material.

22. The appliance according to Claim 21, wherein the conditioner is a cooler.

23. The appliance according to Claim 21, wherein the conditioner is a pressurizer.

24. The appliance according to Claim 1, wherein the discharger includes a restoring mechanism capable of controllably releasing condensed hydrogen to provide gaseous hydrogen to the converter.

25. The appliance according to Claim 24, wherein the restoring mechanism includes a heating mechanism.

26. The appliance according to Claim 25, wherein the heating mechanism provinces heat by any one of chemical heating, resistive heating, radio frequency heating, microwave heating, electrical heating, electromagnetic heating, and any combination thereof.

27. The appliance according to Claim 24, wherein the restoring mechanism further includes a subcontroller.

28. The appliance according to Claim 24, wherein the restoring mechanism further include at least one sensor.

29. The appliance according to Claim 28, wherein the at least one sensor includes any one of a temperature sensor, a pressure sensor, a partial pressure sensor, chemical sensor, and a flow sensor.

30. A hydrogen storage container usable in an appliance including a converter capable of using a substantially carbon-free hydrogen, a charger, and a discharger, the hydrogen storage container including:

(a) a carbon-based nanostructured material and

(b) a metal capable of acting as both a seed for the formation of the nanostructured material and a facilitator for promoting the storage in a condensed state of the substantially carbon-free gaseous hydrogen provided to the storage container.

31. The hydrogen storage container of Claim 30, wherein the metal is a transition metal.

32. The hydrogen storage container according to Claim 31, wherein the transition metal is any one of magnesium, titanium, iron, nickel, cobalt, aluminum mixtures thereof, alloys thereof and combination of any (Andrei, please and any additional metals that you believe will work).

33. The hydrogen storage container of Claim 30, wherein the metal has a size less than about 100 nanometers.

34. The hydrogen storage container according to Claim 33, wherein the metal size is less than about 10 nanometers.

35. The hydrogen storage container of Claim 34, wherein the metal has a size less than one nanometer.

36. The hydrogen storage container according to Claim 30, wherein the metal promotes the Van der Waals' bonding of the hydrogen to the nanostructured material to facilitate storage in a condensed state.

37. The hydrogen storage container according to Claim 31, wherein the metal promotes the covalent bonding of hydrogen to the nanostructured material to facilitate storage in a condensed state.

38. The hydrogen storage container according to Claim 30, wherein the carbon-based material is a multiple-walled carbon nanotube.

39. The hydrogen storage container according to Claim 38, wherein the multiple-walled carbon nanotube includes a zigzag structure.

40. The hydrogen storage container according to Claim 38, wherein the multiple-walled carbon nanotube includes a chiral structure.

41. The hydrogen storage container according to Claim 38, wherein the multiple-walled carbon nanotube includes an armchair structure.

42. The hydrogen storage container according to Claim 38, wherein the carbon-based material is a single-walled carbon nanotube.

43. The hydrogen storage container according to Claim 42, wherein the single-walled carbon nanotube material has a zigzag structure.

44. The hydrogen storage container according to Claim 42, wherein the single-walled carbon nanotube has a chiral structure.

45. The hydrogen storage container according to Claim 42, wherein the single-walled carbon nanotube has an armchair structure.

46. The hydrogen storage container according to Claim 30, wherein the carbon-based material has a platelets structure.

47. The hydrogen storage container according to Claim 30, wherein the carbon-based material is a graphite encapsulated metal nanoparticle.

48. The hydrogen storage container according to Claim 30, wherein the nanostructured material is capable of reversibly storing hydrogen up to at least about seven weight percent.

49. The hydrogen storage material according to Claim 48, wherein the nanostructured material is capable of reversibly storing hydrogen up to about 14 weight percent.

50. The hydrogen storage container according to Claim 30, wherein the container is interchangeable.

51. The hydrogen storage material according to Claim 30, wherein the container is pressurizeable.

52. The hydrogen storage material according to Claim 51, wherein the pressurizeable container is capable of use at elevated temperatures.

53. An appliance comprising:

(a) a converter capable of using a substantially carbon-free hydrogen;

(b) a hydrogen storage container capable of storing the substantially carbon-free hydrogen in a condensed state, the container including:

(i) a carbon-based nanostructured material and

(ii) a metal capable of acting as both a seed for the formation of the nanostructured material and a facilitator for promoting the storage in the condensed state of the substantially carbon-free gaseous hydrogen provided to the storage container;

(c) a charger capable of facilitating the storage in the condensed state of a substantially carbon-free gaseous hydrogen provided to the storage container;

(d) a discharger for liberating the condensed substantially carbon-free hydrogen from the nanostructured material of the hydrogen storage container so as to available for use in the converter; and

(e) a controller for regulating the cooperation of the converter, the charger and the discharger.

54. A continuous vapor deposition method for synthesizing a mixture of carbon nanostructures and metal nanoparticles comprising:

(a) in a first stage, heating in an oxidizing flame a precursor, therein forming a metallic intermediate of nascent metal nanoparticles;

(b) in a second stage, heating in a relatively cooler reducing flame the metallic intermediate formed in the first stage, therein forming metal nanoparticles and a mixture of nascent carbon nanostructures; and

(c) in a third stage, quenching and depositing on a relatively cold substrate the metal nanoparticles which catalyze the nucleated growth of depositing carbon nanostructures, therein forming a mixture comprised of carbon nanotubes, graphite encapsulated metal nanoparticles, and nanofibers.

55. The method according to Claim 54, wherein the method further comprises the introduction of a cooling additive to the second stage.

56. The method according to Claim 55, wherein the precursor is an inorganometallic or organometallic material.

57. The method according to Claim 55, wherein the metallic intermediate is an oxide of an alkaline earth metal, an oxide of a transition metal or an oxide of a combination of metals.

58. The method according to Claim 55, wherein the metallic intermediate is a multi-functional catalyst, where said multi-functional catalyst is a nucleation catalyst for the initiation and growth of carbon nanotubes, nanofibers, and graphite-encapsulated metal particles, and where said multi-functional catalyst is a dissociation catalyst that facilitates the storage of hydrogen in nanostructures.

59. The method according to Claim 54, wherein the oxidizing flame of the first stage has an overall stoichiometry that is fuel-lean.

60. The method according to Claim 54, wherein the reducing flame of the second stage has an overall stoichiometry that is fuel-rich.

61. The method according to Claim 54, wherein the relatively cold substrate of the third stage is a disk.

62. The method according to Claim 61, wherein the second stage of the method terminates aligned and displaced from target vapor deposition surface of the disk.

63. The method according to Claim 61, wherein the disk is rotating.

64. The continuous vapor deposition method as claimed in claim 1, wherein the precursor is an organometallic material such as ethyl magnesium, magnesium ethoxide nickel B-ketonenolate, and magnesium aluminum isopropoxide.

65. The method according to Claim 54, wherein the precursor is an organometallic material such as ethyl magnesium, magnesium ethoxide nickel B-ketonenolate, and magnesium aluminum isopropoxide.

66. A low pressure continuous vapor deposition method for synthesizing a mixture of carbon nanostructures and metal nanoparticles, wherein the method is performed at pressures less than or equal to about 500 torr, comprising:

(a) in a low pressure first stage, heating in an oxidizing flame a precursor, therein forming a metallic intermediate of nascent metal nanoparticles;

(b) in a low pressure second stage, heating in a relatively cooler reducing flame the metallic intermediate formed in the first stage, therein forming metal nanoparticles and a mixture of nascent carbon nanostructures; and

(c) in a low pressure third stage, quenching and depositing on a relatively cold substrate the metal nanoparticles which catalyze the nucleated growth of depositing carbon nanostructures, therein forming a mixture comprised of carbon nanotubes, graphite encapsulated metal nanoparticles and nanofibers.

67. The method according to Claim 66, wherein the pressure is less than or equal to 200 torr.

68. The method according to Claim 67, wherein the method further comprises the introduction of a cooling additive to the second stage.

69. The method according to Claim 68, wherein the precursor is an inorganometallic or organometallic material.

70. The method according to Claim 68, wherein the metallic intermediate is an oxide of an alkaline earth metal, an oxide of a transition metal or an oxide of a combination of metals.

71. The method according to Claim 68, wherein the metallic intermediate is a multi-functional catalyst, where said multi-functional catalyst is a nucleation catalyst for the initiation and growth of carbon nanotubes, nanofibers, and graphite-encapsulated metal particles, and where said multi-functional catalyst is a dissociation catalyst that facilitates the storage of hydrogen in nanostructures.

72. The method according to Claim 66, wherein the oxidizing flame of the first stage has an overall stoichiometry that is fuel-lean.

73. The method according to Claim 66, wherein the reducing flame of the second stage has an overall stoichiometry that is fuel-rich.

74. The method according to Claim 66, wherein the relatively cold substrate of the third stage is a disk.

75. The method according to Claim 74, wherein the second stage of the method terminates aligned and displaced from target vapor deposition surface of the disk.

76. The method according to Claim 74, wherein the disk is rotating.

77. A system for the continuous vapor deposition synthesis of a mixture of carbon nanostructures and metal nanoparticles comprising:

(a) an inline flame combustion chamber having an oxidizing zone and a cooler reducing zone that terminates with an exhaust exit; and

(b) a vapor deposition substrate that is relatively cold; wherein:

(i) the oxidizing zone has a burner having a fuel input line, an oxidant input line, and a precursor input line;

(ii) the reducing zone has a burner having a fuel input line, an oxidant input line, and a coolant additive input line; and

(iii) the exhaust exit is aligned with the vapor deposition substrate.

78. The method according to Claim 77, wherein the vapor deposition substrate is a rotating disk.

79. The method according to Claim 77, wherein the precursor input line conveys an inert gaseous carrier that transports the precursor as a vapor or a nebulized mist.

80. The method according to Claim 77, wherein the coolant additive input line transports an inert gas such as a Nobel gas or a mixture of gases, or a relatively inert gas selected from the group consisting of nitrogen, water, water vapor, carbon monoxide and carbon dioxide or a combination of gases.

81. A continuous vapor deposition method for synthesizing a mixture of carbon nanostructures and metal nanoparticles comprising:

(a) in a first stage, heating or decomposing in a carbon monoxide/oxygen flame a precursor, therein forming a metallic intermediate of nascent metal nanoparticles;

(b) in a second stage, cooling by means of carbon monoxide addition, in a relatively cooler reducing flame the metallic intermediate formed in the first stage, therein forming metal nanoparticles and a mixture of nascent carbon nanostructures; and

(c) in a third stage, quenching and depositing on a relatively cold substrate the metal nanoparticles which catalyze the nucleated growth of depositing carbon nanostructures, therein forming a mixture comprised of carbon nanotubes, graphite encapsulated metal nanoparticles, and nanofibers.

82. The method according to Claim 81, wherein the precursor is an metal halide.

83. The method according to Claim 82, wherein the metal halide metal is a metal fluoride.

84. The method according to Claim 83, wherein the metal fluoride such as iron fluoride.